

Improving Data Discovery and Access through Interoperable System in Climate.gov

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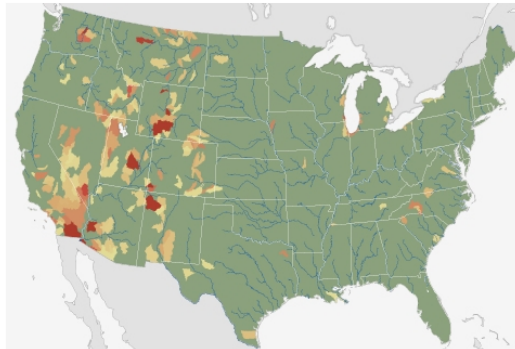
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Featured on Climate.gov

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Climate change to increase water stress in many parts of U.S. »

October 22, 2013

Filed in:
News & Features

Nearly ten percent of U.S. watersheds are living beyond their means when it comes to their water supply. For nearly half the country, water stress is projected to worsen by mid-century because of climate change.

[read more »](#)

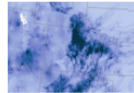
Recent Topics



Teaching Essential Principle 7: Climate change will have consequences for the Earth system and human lives.

July 3, 2012

Filed in: Teaching Climate



Historic Rainfall and Floods in Colorado

September 17, 2013

Filed in: News & Features



Oceans and Marine Resources in a Changing Climate

September 4, 2013

Filed in:
Supporting Decisions

Global Climate Dashboard

▼ Climate Change

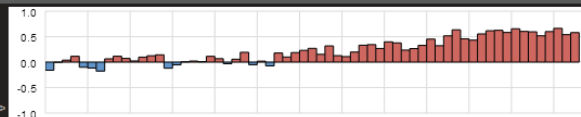
► Climate Variability

► Climate Projections

Global Average Temperature (°C)

The temperature near Earth's surface is rising; the bars show each year's average temperature compared to the 20th century average.

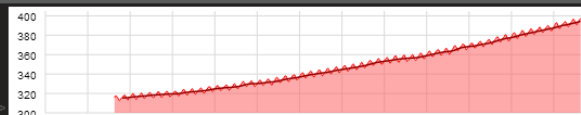
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Carbon Dioxide (ppm)

The amount of carbon dioxide in the atmosphere has risen by 25% since 1958, and by about 40% since the Industrial Revolution.

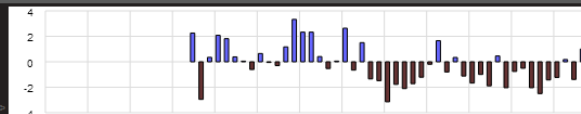
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Spring Snow Cover (million km2)

Snow is melting earlier: each bar shows spring snow cover in the Northern Hemisphere compared to the long-term average.

[Learn More >>](#)



▲ Temperature	▲ Carbon Dioxide	▲ Snow
► Sea Level	► Arctic Sea Ice	► Ocean Heat
► Sun's Energy	► Glaciers	► Heat-Trapping Gases

What is “Interoperability for Climate.gov”?

Interoperability is the ability of diverse systems to work together or inter-operate. The Climate.gov interoperable system interface will allow users to find, display, manipulate, and (where applicable) download NOAA’s and its partners’ climate data products that are stored in and served from different data centers.

Interoperability Requirements

- Format Agnostic.
- Platform Agnostic
- Owner/Physical Location Agnostic.
- Preview Capabilities.
- Semantics/Ontology/Vocabulary.
- Machine to Machine Communication.
- Complete Metadata

Driving Factors

Whitehouse – Open Data Rules to Enhance Government Efficiency and Fuel Economic Growth

- Order requires that, going forward, data generated by the government be made available in open, machine-readable formats, while appropriately safeguarding privacy, confidentiality, and security.
- <http://www.whitehouse.gov/sites/default/files/omb/memoranda/2013/m-13-13.pdf>

NOAA Science Advisory Board (SAB) Environmental Information Services Working Group (EISWG) 'Executive Summary'

- Recommends developing an Open Weather and Climate Services (WCS) in which both NOAA and the community share equal and full access to NOAA information and development
- http://www.sab.noaa.gov/Doc/Towards-Open-Weather-and-Climate-Services-report-and-transmittal_12_23_11.pdf

Why do we want it?

- Expansion of data use and efficiency and reach out to larger group of the people
- Increase/improve accessibility of NOAA data and cross the bridge of data formats
- One stop source of Climate Information
- Encourage Standards that increases the larger pools of the users' with same investment in data
- Standards will limit the diversity of data providing scheme and will create less complexity in the data management with improved implementation.

Impacts

Framework built towards Standards, NOT Data.

Important Because:

- Data is ready for action. Services model facilitates agile capabilities. Services can be combined or reused quickly.
- Any data available through framework can be operated on or combined with other data. Integrated standardized formats and access.
- New and existing systems have access to wide variety of data. Any new data added, easily incorporated with minimal to no changes required.

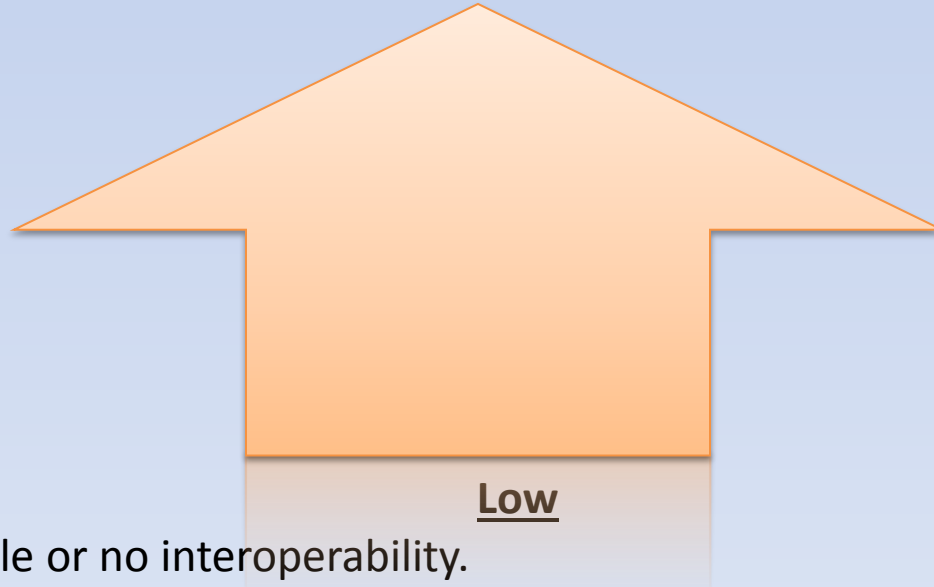
Measuring Interoperability

High

Extensive interoperability.

Little human interpretation and intervention required.

Simple configuration rather than custom coding.



Low

Little or no interoperability.

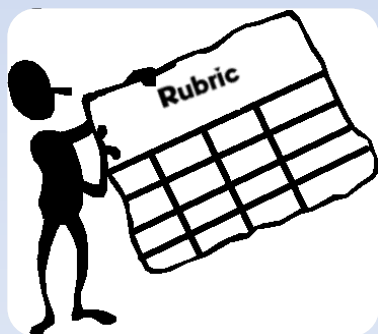
Significant human interpretation and intervention required.

Extensive custom coding.

Interoperability Readiness Levels

- Measureable indicators...

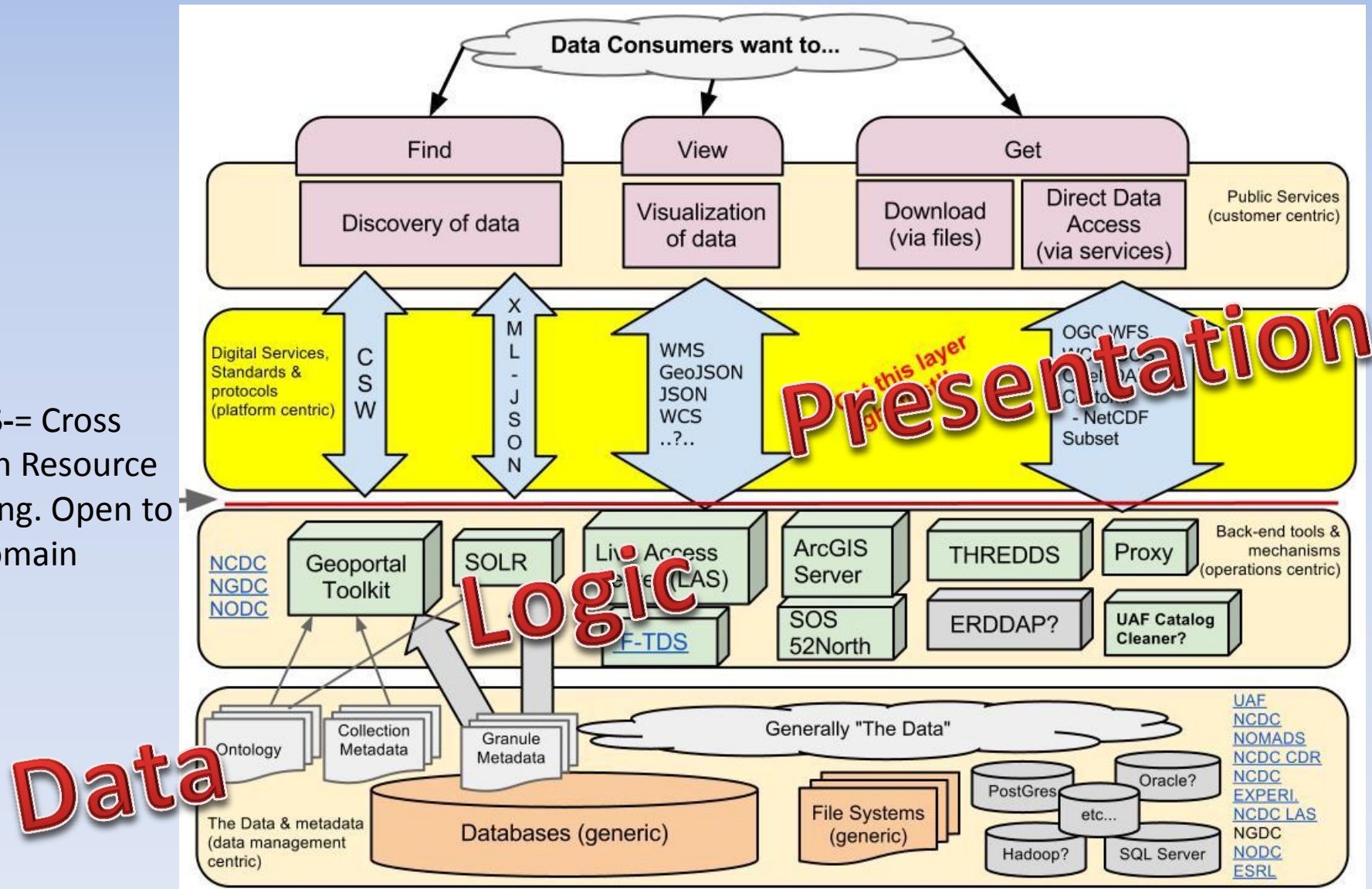
	Capability Enablement	Discovery	Access	Understanding	Data	Standards
Level 1	Data from different sources cannot be used together	Probably none, hard coded or inaccessible catalog interface	Not modular components (part of a larger application), platform specific, undocumented, no distributed access, closed/restricted source (not open source)	Content of data is not directly comparable to any other data	Data in unknown or undocumented formats with little or no auxiliary content information available	Individual standards.
Level 2	Human use of data from different sources using different code for each	REST-style access to form interface (via scraping)	Proprietary and complicated dependencies, strict platform dependencies, limited documentation, no discovery (registry)	Some parts of data may be comparable to other data only through informal human to human interaction	Data in documented formats with little or no auxiliary content information available	



Level 8	Human-triggered incorporation of novel data and services into applications	Services discoverable in global registries of services with complete syntactic information	Discipline/Domain-specific ontology support using recognized semantic tools	Semant content commu ontologi
Level 9	Automatic discovery and incorporation of novel data and services into applications with no human intervention	Services discoverable in global registries with complete syntactic and semantic information	AI capability. Completely automated mediation of services.	Semant content univers ontologi

Interoperable System Architecture

CORS== Cross
Origin Resource
Sharing. Open to
all domain



Prototyping for select Use Case

- Built a proof of concept Data Interoperable Platform
- The built system is “file format agnostic,” meaning the pilot system will locate and display the data regardless of what format they’re archived
- The web based client was developed using javascript libraries from OpenLayers and JQuery. OpenLayers library provides javascript utilities to interact with a variety of data and metadata services. JQuery provides utilities to construct the layout of the web page itself
- The codes are available to download and fork out in github:
<https://github.com/ClimateData/interoperability>

Findings

Metadata incomplete, difficult to maintain.

- Create tools to improve and automate metadata creation.

Data not easily discoverable. Often requires prior knowledge to answer basic questions: who, what, where, how?

- Metadata, Metadata, Metadata.

Limited details of what this data should look like?

- Preview or other information of how should data be visualized.
- Open Geospatial Consortium (OGC) Styled Layer Descriptor (SLD) and Symbology Encoding (SE).

Incomplete or lack of adherence to standards.

- Analyze and provide feedback to data providers.
- Do services meet standards?

Cross Domain Content is restricted

- Implement CORS (Cross-Origin Resource Sharing)

Challenges

- Mixed environments
- Multiple data types and Data Discovery, Access
- GIS Services (ESRI + Open Source)
- Technological change
- Diverse standards adoption

Next Steps...

- Improved User Interface adding more functionality and bringing interoperability concepts together
- Best practices and recommendations for interoperable environment
- Phased implementation of Interoperable Data Platform Requirements
- Standards and policy
- Compliant Metadata
- Advocacy & outreach
- Solicit suggestions on our proposed Interoperability System Architecture.
- Improved search with suitable Ontology in Geoportal